Selecting the Suitable Job Quality Items in Profiling and Job Matching Algorithms for Public Employment Services

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Abstract

This report takes its starting point in the lessons learned from first generation statistical profiling systems in Public Employment Services (PES) and the sociological vision of labour market integration and good-quality work. Commonly job quality is not considered in statistical profiling, instead exit to any type of employment is modelled. We discuss and operationalize the multi-dimensional concept of job quality with a view on whether and how job quality items can be integrated into a tool computing the probability of exit into good jobs. Importantly, we also consider whether such items can be used in more advanced visualization platforms providing the unemployed and job seekers a snapshot of their labour market options. The aim of the report is thus to translate the findings from work package 1 on the sociological-led user vision into job quality dimensions and items (variables) that can be measured either with register data or with European survey data and which can then be integrated in the development of our HECAT platform in work package 3.

Keywords: Algorithms, EU survey data, job quality, matching, profiling, public employment services

Introduction

This report takes its starting point in the lessons learned from first generation statistical profiling systems in Public Employment Services (PES) and the sociological vision of labour market integration and good-quality work. These have been the focus of comprehensive analytical work and on-site field work as part of work package 1 (WP1) on the lived experience of unemployed (and case workers) in Europe and Slovenia, where our PES pilot sites are located (Griffin et al. 2020, deliverable 1.3; Demazière and Delpierre 2020, deliverable 1.4; Hansen and Pultz 2021, deliverable 1.1). This report focuses on the measurement of labour market integration and quality work, pointing to the possibilities but also gaps in available data. We discuss and operationalize the multi-dimensional concept of job quality with a view on whether and how job quality items can be integrated into a tool computing the probability of exit into good jobs. We also question whether such items can be used in more advanced visualization platforms providing the unemployed and job seekers a snapshot of their labour market options. The ultimate aim of the report is thus to translate the findings from WP1 on the sociological-led user vision into job quality dimensions and items (variables) that can be measured either with register data or with European survey data and which can then be integrated in the development of our HECAT platform in WP3.

State-of-the-art statistical profiling tools in PES have many shortcomings and this includes that they draw on sensitive personal data, have limited accuracy and transparency, can be discriminatory and categorize unemployed persons broadly instead of focusing on their actual and complex situation (e.g. Griffin et al. 2020, deliverable 1.3; Næsborg-Andersen et al. 2021, deliverable 2.2). These limitations have led courts to shut down several profiling algorithms on legal grounds. Nevertheless, they remain commonly used in PES nowadays and this is why this report takes them as a starting point with a view to improving the output variable. The aim of the HECAT platform, however, is to go beyond profiling, we thus discuss job quality dimensions and items also with a reference to more enabling components of the platform including the visualisation of job possibilities.

The report discusses multi-dimensional job quality in a pluralist way drawing on findings from different academic disciplines and highlighting recommendations for as well as challenges in capturing job quality. Drawing on European data sets such as the European Labour Force Survey (EU-LFS) and the European Working Conditions Survey (EWCS), it provides concrete suggestions as to how a more sustainable vision of the labour market around the concept of job quality can be translated into predicting jobseekers' likelihood to find a good job and how job quality, as defined by the unemployed and/or jobseekers, can be used in job matching and visualisation of labour market options.

This requires that we in section 1 first discuss the benefits and limitations of state-of-the art profiling tools. While they can be useful in terms of focusing limited resources – for example for counselling or activation measures - on cases where their effect is expected to be the largest, they also have several drawbacks. We focus in particular on their common focus on exiting the benefit record without considering sustainable labour market integration. The output variable thus is usually defined as taking up employment without considering job quality as captured for example by the fit between the new job and educational qualifications, the level of wages, the contractual status and job security or working-time and intensity. The current approach to profiling is problematic from the viewpoint of the jobseekers as it does not take into account their lived experience of unemployment (Demazière and Delpierre 2020, deliverable 1.4) , their wishes and aspirations for future labour market integration (see Hansen

and Pultz 2021, deliverable 1.1). Moreover, profiling systems targeting any kind of employment rather than quality employment can also be inefficient from the perspective of the PES and the society as a whole as unsustainable labour market integration is likely to lead to vicious circles where people circle between (short-term) employment and unemployment.

In order to correct for the aforementioned shortcomings of these job matching tools, in section 2 we then scrutinise the multi-disciplinary literature on job quality. We draw on lessons learned from a range of multi-dimensional job quality indices developed in Europe, and considering the different functionalities of the HECAT platform which aims to cater both to unemployed, jobseekers and case workers, we propose seven dimensions of job quality to consider in our HECAT platform. The dimensions are pay and other rewards, intrinsic characteristics of work, terms of employment, health and safety, work-life balance and representation and voice and distance to work.

Section 3 translates these recommendations into practice. We do a census of European comparative data and propose a set of concrete items (variables) for each of the seven job quality dimension. We prioritise European comparative datasets as they will enable us to transfer the HECAT platform beyond our pilot site in Slovenia. Given that the HECAT platform will be linked to PES which have access to register data and data collected in interviews with unemployed and jobseekers, we also emphasise the possibility of using such data where European comparative data has limitations. We provide an assessment of the importance of the different job quality items ("need to have" and "nice to have" which also includes an intermediate option) but this is necessarily subjective, and it should ultimately be the unemployed and jobseekers who decide which job quality dimensions are key for them.

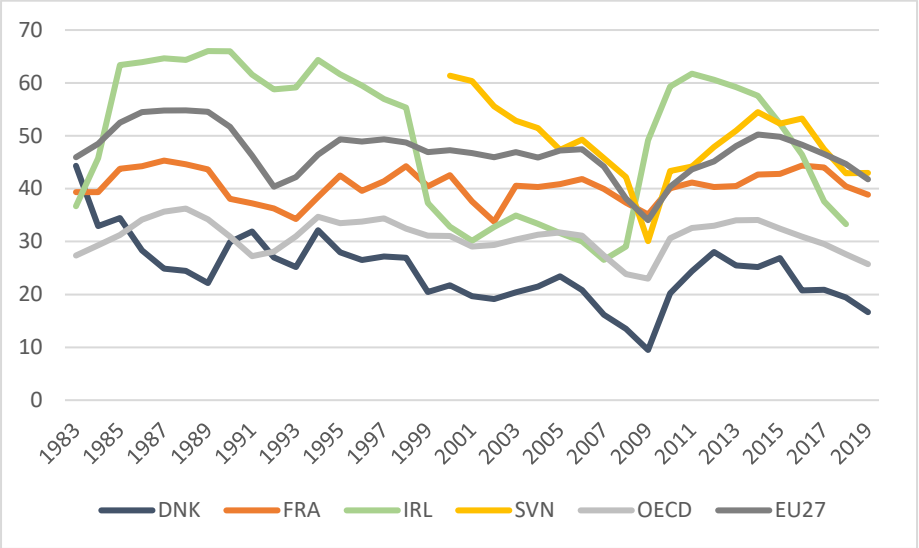
1. The output variable(s) of a profiling tool

Algorithms that profile jobseekers have developed since the 1990s with the objective of increasing the efficiency of public employment services' expenditures in a context of budget constraints (Griffin et al. 2020, deliverable 1.3). They aim at identifying individuals that have little counselling needs, and those for whom intensive counselling and active labour market policies (ALMP) are expected to have the largest returns. The ultimate goal is to target expenditures towards the latter. A consensus has developed to proxy needs for counselling and for ALMP by the expected length of unemployment spells, in a context of a rising focus on long-term unemployment (LTU), especially for the youth (O'Reilly et al, 2018).– on the causes of LTU.

1.1 Reasons to fight long-term unemployment

The focus on long-term unemployment (LTU), at least dates back to the full chapter devoted to this issue in the first OECD Employment Outlook, entitled "The Employment Imperative of Labour Market Policies" (OECD 1983). In the OECD framework, LTU accounts for the share of jobseekers that has remained unemployed for more than 12 months. Since 1983, this quantity has not fallen below 23% on average in the OECD and below 33% in the EU. Importantly, LTU strongly varies across countries. In particular, the institutional configuration, including the scope and the timing of ALMP, plays a strong role (EC, 2005) – on the ethos of activation, see Boland and Griffin (2015) and Hansen (2019). Korea and Greece are at each extreme of the spectrum with rates of 0.91% and 70.14% respectively in 2019.

Figure 1 - Share of unemployment spells longer than 12 months in the EU and the OECD



Source: OECD data

Large rates of LTU pose several challenges from the perspective of governments. Jobseekers usually receive unemployment benefits – or social assistance if not eligible or upon completion of their unemployment insurance benefits – without producing taxable labour. As a result, the more numerous and the longer unemployment spells, the stronger the risk for imbalances in public finances. Note as well that the probability to start an informal job could increase with the duration of unemployment spells – and especially upon exhaustion of the unemployment benefits – thereby decreasing future public revenues if individuals get locked into such jobs.

Importantly, long unemployment spells are also detrimental to the individuals. Unemployment duration first affects jobseekers' physical health (e.g. Stauder, 2019). Likewise, Edin and Gustavsson (2008) show that longer unemployment spells are associated with larger loss of skills. According to their analysis, each year of unemployment moves individuals down the skill distribution by five percentage points. Effects are the strongest for individuals with continuous unemployment spells. Everything else equal, longer unemployment spells therefore reveal a lower productivity that reflects into future earnings and seems irrecoverable. Gregory and Jukes (2001) estimate, for example, that each additional year in the duration of unemployment spells by a year implies a 10 percentage point penalty in wages that is not compensated over time. A negative association between jobseekers' bargaining power and unemployment duration may also contribute to this outcome.

Helping individuals to find a job as early as possible in their unemployment spell should therefore improve public budgets while protecting individuals from the negative impacts of LTU spells on physical health, skills and ultimately wages. In a context of budget constraints, and because the negative impact of remaining longer-term unemployment is likely to strengthen with the initial length of the unemployment spell, institutions have worked on channelling resources and incentives towards the individuals that are the most likely to become long-term unemployed.

As a side note, it is worth mentioning the intense ongoing debate about the impact of unemployment duration on the probability to re-enter the labour market, as a negative duration

dependence of unemployment benefits would reinforce the former line of argument.[1] Many authors have used field experiments to measure the relation between employers' willingness to interview jobseekers and the duration of their unemployment spell (Eriksson and Rooth 2014; Farber et al. 2019; Farber, Silverman, and Wachter 2017; Farber, Silverman, and von Wachter 2016; Kroft, Lange, and Notowidigdo 2013; Nunley et al. 2017; Nüß 2018). They respond to real job offers with fake CVs that only differ by the length of their ongoing unemployment spell and measure the variation in callback rates. Results of these empirical analyses are not neat. Kroft et al. (2013), Eriksson and Rooth (2014), Nüß (2018) and Farber et al. (2019) measure a clear negative duration dependence, but Farber et al. (2017, 2016) and Nunley et al. (2017) find no effect of the unemployment duration on the callback rate. To this date, these conflicted results remain unexplained and more research is needed on this matter (see the discussion in Farber et al. (2019, 2017)). Importantly enough, these field experiments focus on the probability to make it to the job interview, which may not translate into actual positions. Thus, Jarosch and Pilossopha (2019) develop a model suggesting that unfortunate candidate that are not invited to an interview *because* of the length of their unemployment spell would not get the job had they been unemployed for a shorter time. Overall, proofs of a duration dependence in the job finding rate are therefore limited. Unemployment duration would therefore only marginally affect individuals' probability to find a job, expectedly because employers offer lower wages to the jobseekers with longer-term unemployment experience to compensate their loss in skills.

Independently of the societal and individual impact of unemployment duration, individuals most likely to remain unemployed in the long run may share some characteristics that limit their ability to reintegrate into the labour market. For instance, jobseekers who are the most likely to become long-term unemployed differ from the other jobseekers because they they tend to overestimate their likelihood to find a job over the whole duration of their unemployment spell (Mueller, Spinnewijn, and Topa 2021; Spinnewijn 2015). These overconfident jobseekers are likely to have high reservation wages, which may limit their chances to reintegrate into the labour market. Support from public employment services (PES) to reassess their position on the labour market should therefore be highly efficient for this group. Overconfidence is hard to detect for PES caseworkers. Using the LTU likelihood as a proxy can therefore be a good avenue. PES support is also useful to help jobseekers to reassess the returns to expect from their job search and to understand better the impact of LTU duration on skills and wellbeing. Studies have shown that jobseekers that are the most likely to fall into LTU are also those with the worst self-assessment of these two dimensions. Identifying these jobseekers is therefore useful to improve the targeting and efficiency of PES services. This is what is suggested in a recent randomized experiment by Altmann et al. (2018). They provide jobseekers a brochure informing them about: (i) the good timing to apply for jobs given the recovering state of the economy (the experiment took place in Germany in 2010-2011); (ii) the duration dependence and the returns to search effort; (iii) the impact of unemployment on wellbeing; (iv) the role of alternative channels to the PES to find jobs. This simple intervention had significant and large impact on the employment prospects of jobseekers likely to become long-term unemployed but not on the rest of the jobseekers. Last, a high long-term unemployment likelihood may reveal a low employability and therefore low potential "lock-in" effects of ALMP, thereby increasing the net effect to expect from ALMP.[2]

[1] A negative duration dependence occurs when the probability to re-enter the labour market decreases with the length of unemployment spells.

[2] Lock-in effects describe the inability of jobseekers to reintegrate into the standard labour market while they receive training or are employed in subsidized jobs.

Overall, the impact of unemployment duration on public budgets and individuals' outcomes as well as the association between LTU likelihood and jobseekers' assessment of their labour market opportunities has triggered a consensus to develop algorithms that are able to profile jobseekers at an early stage according to LTU likelihood. This best practice is strongly promoted by some of the international institutions (OECD 2002; Loxha and Matteo 2014 for the World Bank).

1.2 The output variable of current profiling tools, first drawbacks

As described in the previous section, profiling the unemployed based on their likelihood to become long-term unemployed is considered as a best practice for public employment services. Table 1 below shows that all but two countries (Austria & Estonia) therefore use the probability to remain unemployed over either 6 or 12 months as an output variable.

Table 1 – Output variables of different profiling tools (adapted from Griffin et al. (2020, deliverable 1.3))

Country	Ambition	Source
Ireland- PEX	Identifying those at risk of LTU (12 months)	O'Connell, McGuinness, Kelly, & Walsh (2009) Griffin,Boland, Tuite & Hennessy (2020)
Austria- AMAS	Build three groups: - High probability to find a non-subsidised work lasting more than 3 months in the following 7 months - Low probability to work in a non-subsidised job lasting more than 6 months in the next 2 years - The rest	Allhutter et al. (2020)
Denmark- Job Barometer	Identifying those at risk of LTU (6 months)	Roshol, Svarer and Hammer (2004); Madsen (2014); Larsen, Brigitte &Jonsson (2011)
France- Intelligence Emploi	Identifying those at risk of LTU (6 months)	OWALGROUP (2019)
Australia- JSCI	Identifying those at risk of LTU (12 months)	Ponomareva & Sheen (2013); Lipp, (2005)
Croatia- StAP	Identifying those at risk of LTU (12 months)	Botrić (2017); Flesicher (2016)
Finland- Risk Profiling Tool	Identifying those at risk of LTU (12 months)	Riipinen (2011); Behncke et al. (2007)
Belgium-VDAB	Identifying those at risk of LTU (6 months)	Desiere, Langenbucher, Struyven (2019)
Estonia- Soft Profiling	ALMP effect	Van Ours (2007), Brixiova and Egert (2012)
Italy	Identifying those at risk of LTU (12 months)	OECD (2019a)
Latvia	Identifying those at risk of LTU (12 months)	Desiere, Langenbucher, Struyven (2019) OECD (2019b)
Netherlands- WorkProfiler	Identifying those at risk of LTU (12 months)	Wijnhoven and Havinga (2014); Hasluck (2008)
New Zealand-SEM	Identifying those at risk of LTU (6 months)	Ministry for Social Development (2018)
Sweden-AST	Identifying those at risk of LTU (6 months)	Loxha and Morgandi (2014)

These output variables are seemingly easy to measure, objective, simple to grasp for both the unemployed and the caseworkers and transparent – which matters for such algorithms as discussed in Næsborg-Andersen et al. (2020, deliverable 2.2). However, when going into details, things appear to be more complex. The profiling algorithms are, for example, defined in terms of formal employment – the PES having no knowledge of informal employment. In

countries where informal employment plays a strong role, including in Slovenia according to Hansen and Pultz (2021, deliverable 1.1), algorithms may therefore identify jobseekers as high risk, and send them to costly training sessions even though they have a preference for the informal market and will keep working on it anyway.[3]

Furthermore, most models in place measure the probability to leave the benefit record for any type of employment rather than for sustainable employment.[4] These models thus do not take into account the revolving door between the unemployment insurance and short-term employment. Individuals who keep going back and forth between employment and unemployment are thus classified as low risk and therefore not offered extensive support whereas their specific characteristics may be closer to the jobseekers who remain unemployed over 6 / 12 months than to jobseekers who find sustainable employment. A more promising avenue would be to distinguish workers based on their likelihood to find a stable job – which some authors define as a job lasting longer than the maximum legal length of fixed-term contracts (Lopez, 2004). Note that the OECD is aware of this risk. It states that "on average only one-eighth of the unemployment-months experienced within the four-year window either side of December 1995 occurred outside the completed current spell of unemployment" OECD (2002: 201). The report considered this figure to be low enough to justify the aim of reducing the length of unemployment spells – and therefore to target the individuals most likely to *remain* unemployed over 12 months – rather than promoting stable employment – which would imply targeting jobseekers based on the unemployed duration over several years for instance. However, the intensity of the revolving door has strongly increased since 1995 and the previous justification is unlikely to still hold today (Khoury 2019).

Next, behind an apparently very straightforward and neutral measure important subjective choices are hidden. Profiling models compute individuals' probability to become long-term unemployed. To classify individuals into several risk groups, PES must decide upon thresholds that divide the distribution of LTU. These thresholds therefore define how 'at risk' an individual must be to "qualify" for the high-risk profile. It can be defined in absolute terms – e.g. high risk individuals are those with p>0.50% - but also in relative terms – e.g. high risk individuals are those found in the top 10% of the LTU probability distribution. Choosing a classification threshold is not neutral and can respond to many different concerns. Budget constraints are the first one: the higher the threshold, the lower the number of individuals classified as high risk – to whom more expensive services are generally delivered. Second, choosing a classification threshold implies choosing a level of performance for the algorithm. Kern et al. (2021) highlight this point for the German case. They train different types of algorithms[5] on register data between 2010 and 2015 and run them to classify individuals starting an unemployment spell in 2016. They then compare their prediction with the actual length of unemployment spells as observed in the 2016 dataset. The authors find the usual trade-off between two common accuracy measures (precision and recall) and show that they are conditioned by the value chosen for the threshold.[6] The literature has no clear-cut argument to favour a performance measure over the other and the choice should ultimately be jointly

[3] On the rationality of working in the informal sector, see for instance Albrecht et al. (2009)

[4] The Austrian case in an interesting counter-example. We discuss it further below.

[5] Based on: (i) a logistic regression; (ii) a penalized logistic regression; (iii) a random forest; and (iv) gradient boosting machines

[6] The precision and the recall rates are defined as the "proportion of correctly identified LTU episodes among all predicted LTU episodes" and the "Proportion of correctly identified LTU episodes among all LTU episodes" (Kern et al. 2021). They are negatively correlated to each other and the former increases with the classification threshold while the latter decreases with the threshold.

made by policy makers and statistician – with the potential involvement of caseworkers. Last, the threshold has some implications in terms of fairness. Kern el at. (2021) provide estimations allowing to compare the representation of non-Germans and Germans in both the predicted and the actual probabilities of remaining unemployed for more than 12 months. For all the models tested, the difference between the actual and predicted probability to be classified as high risk according to the nationality is impacted by the threshold. In all cases, the threshold allowing to reach the largest accuracy levels (defined as the average between the precision and recall rates) offers very poor levels of fairness.

Overall, the apparent objective categorization of individuals into high- and low- risk of LTU is therefore driven by hidden preferences. Classification of individuals as high risk depends on how the producer of the algorithm respectively values budget constraints, the algorithm performance and fairness. These underlying preferences are generally concealed. For instance, in the Austrian case, the company that developed the algorithm wrote in their first policy paper that the cut-off point was chosen to maximize the sum of the sensitivity and specificity of the model (Holl, Kernbeiß, and Wagner-Pinter 2019, cited in Allhutter et al., 2020). However, Allhuter et al. (2020) explain that, in a more recent statement, the Austrian PES instead declared that thresholds were chosen to minimise the number of misclassified individuals that would receive less public support (Buchinger 2019, cited in Allhuter et al. 2020).

In the same vein, the choice of the time window to define jobseekers as long-term unemployed is arbitrary. Table 1 shows that some countries target the jobseekers most at risk of remaining unemployed longer than six months while others choose a 12-month window. In principle, this decision should be discussed and justified on the basis of explicit policy objectives. This was the case in the US, for instance, when the Unemployment Compensation Amendments required PES agencies in each State to develop a profiling system able to identify claimants that were likely to remain unemployed after the exhaustion of their rights (Black 2003). A 6-month window was chosen to fit the length of the unemployment benefits. However, in most institutional cases, the time-window of the output variable is barely justified. In Ireland for instance, the developers of the profiling tool justify their choice of a 12-month window quite tautologically[7], despite some estimations suggesting that the decision has some implications. They developed several models fitting the probability to leave the unemployment record after 6, 12 and 15 months. While all models reach similar accuracy levels (O'Connell, McGuinness, and Kelly 2012), the predictive power of the explanatory variables and the size of the corresponding coefficients somewhat differ according to the output variable (O'Connell et al. 2009; see more on accuracy issues in Griffin et al. 2020, deliverable.1.3).[8] In comparative terms, the Irish team worked in a very transparent way and their models were published and discussed in several papers. Still, a deeper justification of the choice of a 12-month window seems necessary. Likewise, in Austria, the method paper produced by the firm that created the algorithm (Holl, Kernbeiß, and Wagner-Pinter 2018) explains that the definition of the

[7] "In developing a profiling model the dependant variable used will be determined by the objectives of the profiling project, a decision that is driven by policy objectives of PES (Hasluck, 2008). For instance, in the United States, where the principal concern relates to exhaustion of unemployment insurance (UI), the dependent variable is generally the period remaining to exhaustion. In the case of Ireland, where the policy focus is on the risk of falling into longterm unemployment, the dependant variable will reflect the risk of remaining unemployed for more than 52 weeks (i.e. twelve months)." (O'Connell, McGuinness, and Kelly 2012:145)

[8] E.g. English proficiency significantly decreases the probability to be unemployed longer than 6 months and 15 months but not for the 12-month window. The coefficient attached to the county of Wexford even changes sign with the time window while remaining significant.

dependent variable was decided in coordination with the Austrian PES, but does not give more details on the reason for their choice (Allhutter et al. 2020). In a report on the limitations of the tool, the Austrian Ombudsman (2019) therefore stressed that the arbitrary categories of the dependent variable should be better argued. He states that the definition of the dependent variable is "purely a matter of labour market policy decisions" and insists on the fact that different individuals will be classified as high risk when the dependent variable changes. The categorization of jobseekers – and thereby their access to ALMP and ultimately their chances to find a new job – indeed depends on the integration target (for more information see Allhuter et al. (2020)).

Other researchers have worked on the role of the time window considered in the dependent variable. In particular, Arni et al (2014) use survey data and register data to predict the likelihood to remain unemployed longer than: (i) 6 months; (ii) 12 months. The regression tables show that the predictive power of many explanatory variables differ depending on the time window. In particular, personality traits and family situation matter more for the long-run prediction whereas expectations, job search behavior and life satisfaction weight stronger for the 6-month window.

1.3 The need for a better platform for jobseekers

As described above, commonly used profiling tools are problematic in many respects. Going beyond the issues addressed above, Griffin et al. (2020, deliverable 1.3) drawing on lessons learned from first generation PES algorithms emphasise that profiling usually works on and not with the unemployed. Næsborg-Andersen et al. (2021, deliverable 2.2), in turn, scrutinizes the legal basis for algorithmic decision-making touching on issues such as proportionality, discrimination, fairness, transparency and protection of sensitive data. One of the main problems, but surely not the only drawback, is that current state-of-the art profiling tools in PES tend to focus exclusively on exiting the benefit record without considering sustainable or quality integration into the labour market. Usually, a mere distinction between exit towards employment is made without distinguishing between different types of employment. The quality and sustainability of employment is thus usually not taken into account; instead any employment, including jobs with poor working conditions in terms of wages and/or working-time, job security or fit with qualifications will be considered a success. This seemingly objective and straightforward measure thus hides non-transparent subjective decisions as already highlighted in section 1.2. Such an approach is problematic on individual grounds as it disregards the agency of the unemployed by ignoring his/her lived experience of unemployment (Demazière and Delpierre 2020, deliverable 1.4, section I) and wishes and aspirations for future labour market integration (see Hansen and Pultz 2021, deliverable 1.1, section III). Moreover, depending on the degree of job search requirements and sanctions, such a focus on exits from the unemployment benefit records without job quality in focus, can also be dysfunctional and inefficient both from the perspective of the individual (e.g. Van den Berg and Vikström 2014) and the PES as unsustainable labour market integration is likely to lead to vicious circles where people circle between (short-term) employment and unemployment (e.g. on repercussion of flexible job search behaviour see Vansteenkiste et al 2016).

There has in fact been a trend towards unemployment benefit reforms that led to homogenization of benefits, risk re-categorization, and, importantly, activation (for more information see Clasen and Clegg 2012; on activation see also Hansen 2019 and Demazière and Delpierre 2020, deliverable 1.4, section II). Such developments often implied stricter job

take-up criteria coupled with sanctions through shortening the period where unemployment benefit recipients are allowed to focus their job search on jobs in geographic proximity and that reflect their skills' level and previous wages. More generally, previous decades have seen declines in benefit duration and/or levels and enhanced use of means-tested last-tier benefits (see e.g. Knotz 2020; Immervoll and Knotz 2018; Leschke and Finn 2019). Hansen and Pultz (2021, deliverable 1.1, section 4), provide information on rights and obligations of the unemployed in Slovenia, where our PES pilot site is located. Overall the Slovenian welfare system is portrayed as a hybrid with elements of classic de-commodifying welfare as well as workfare elements of both the work first and social investment type (IBID).

In order to overcome the shortcomings of established profiling systems the HECAT platform aims to not only provide an improved probability of exit score but also a data-driven decision support system that takes ample account of the complex situations and wishes of unemployed and/or job seekers and thereby potentially increases the match quality. As regards the probability of exit score, the ambition is to implement a more ethical algorithm that respects the GDPR, is less discriminatory in the use of data than some of the previous examples and which takes into account job quality in the output variable. This probability will appear on our platform as one of several indicators that can be considered by the jobseeker in her job search activities. The probability score will therefore not be used to profile individuals into groups that would automatically offer different levels of intensity of counselling or of ALMP. The data-driven decision support system, in turn aims to visualize alternative options in the labour market with a focus on quality employment (as defined by the unemployed person him/herself) rather than prescribing exit to any type of employment. On job recommender systems see for example Gutiérrez et al. (2019) and Reusen et al. (2018).

For our platform, we thus need to consider the complexity and multi-dimensionality of jobs going well beyond standard indicators such as skills-occupation match and wages (see e.g. Green 2007). We expand on job quality and challenges in measuring it in a comparative perspective in section 2 below. Providing such information in an easy to navigate visual way might be opening-up labour market re-entry opportunities not previously envisioned by the jobseekers. Interviews with unemployed persons and counsellors in Slovenia revealed that these groups would find it useful to also receive information on skills' upgrading options, for example through active labour market policies (ALMPs), through the platform (see Hansen and Pultz 2021, D1.1). Such skills' upgrading might in fact be necessary in order to ensure fit between the jobseekers' profile and the envisioned job opportunities, for example in neighbouring occupations. ALMPs, and in particular in-depth training and upskilling, are costly and PES in Europe vary strongly in terms of the overall expenditure on ALMPs per unemployed but also the specific measures on offer (see e.g. Hansen and Leschke, forthcoming). Slovenia together with other Central Eastern European countries but also the UK, for example, is among the countries with comparatively low ALMP expenditure (OECD.STATS (Public expenditure and participant stocks on LMP). Hansen and Pultz (2021, deliverable 1.1, section 4.2) highlight a misfit with regard to intentions in terms of social investment policies in PES and available expenditure for such measures. Importantly, the evidence on effectiveness of ALMPs as regards labour market integration is mixed (e.g. Card, Kluve and Weber 2010). Interestingly, ALMP evaluations struggle with a similar question as profiling instruments as to the most suitable outcome for measuring employment integration – should one consider exit from ALMPs to any (unsubsidised) employment or, in turn, focus on sustainable employment (in terms of wages, duration of contract or the like)? Fervers (2021) discusses how activation programmes can pose a danger of impairing job quality and how this negative effect can be tackled.

2. From the current practice to the Hecat vision – accounting for job quality

One of the important features that emerged from the scrutiny of the lived experiences of unemployment, including inequality within unemployment (Demazière and Delpierre 2020, deliverable 1.4,) as well as the in-depth study of the user context in our pilot site (Hansen and Pultz 2021, deliverable 1.1) is that the situation, wishes and prospects of the unemployed and jobseekers vary substantively (within and across national contexts) (see also O'Reilly et al. 2019). This implies that the HECAT platform necessarily needs to operate with a set of options regarding job features and characteristics of job quality. The following considerations are relevant for both predictions of the probability of exit into a good job and of the possible job openings that are relevant for the jobseeker. However, how the different job quality dimensions will be used in practice will likely differ between the two features of the platform.

While the range of job quality dimensions that can be provided will necessarily be restricted by data limitations and some pre-decisions in view of the functionality of the platform, it would not be appropriate to pre-define in a detailed way what a good job is. Rather – in the spirit of working with and not on the unemployed – this should be defined by the unemployed person (potentially in cooperation with the counsellor). An important venue for this will be focus groups to be conducted as part of work package 5 in 2022. Also, importantly, Green (2007), drawing on Amartya Sen's capabilities approach (Sen, 1993) points out that 'the range of capabilities need not be constrained by what the job offers immediately' with regard to work activities and wages (p. 14) – this implies that our tool might also want to focus on providing information on jobs that might serve as stepping stones 'to other jobs with more highly valued tasks or higher wages' (Green 2007, p. 14).

Thus, in the following sections we define job quality in a broad and multi-dimensional way drawing on the interdisciplinary job quality literature and in a further step we identify relevant dimensions and indicators for our platform and matching them with data. It is then up to the users of the platform to combine the various job quality dimensions with the aim to limit their search to jobs with features that are of relevance to their lived experience and current situation (for example in terms of working time flexibility needs, preferences for specific contract types such as apprenticeships or permanent positions, or specific wishes for career advancement).

2.1 Job quality – definitions and social sciences traditions

Different terms are used to denote the qualitative dimension of paid work and among them job quality, quality of work, quality of working life, quality of employment and decent work (see e.g. Bothfeld and Leschke 2012). These terms are often used interchangeably while job quality, quality of work and quality of working life tend to focus more on the job content and work environment, quality of employment and 'decent work' tend to have a broader definition including for example labour relations, rights and gender gaps (Burchell et al. 2014). However, the use is all but clear-cut. In addition, some scholars distinguish between intrinsic and extrinsic job quality (for an example see Bothfeld and Leschke 2012, table 1) and objective (the way in which working conditions affect competencies and opportunities of employees) vs subjective (factors that affect the degree of satisfaction with a jobs) job quality features (Gallie 2007, p. 7f). In this deliverable we use the term 'job quality' and do not limit ourselves to either intrinsic or extrinsic or, in turn, subjective or objective job quality indicators. This seems a suitable strategy as we aim for a comprehensive yet job-focused scrutiny of the qualitative

dimension of paid work which will help us to identify a wide set of possible job (quality) exit options, as valued by the jobseekers. The term job quality is also commonly used by the researchers who have proposed multi-dimensional indices to depict the qualitative dimension of paid employment which will be referred to below when discussing the various job quality dimensions.

There is no agreed conceptualization or operationalization of job quality, rather conceptualization and focus differ between (and within) the social sciences disciplines that engage with job quality; these include economics, sociology and psychology among others. While some studies use single indicators in order to capture job quality, wages being commonly in focus, there has been an increasing trend towards depicting job quality in a multi-dimensional way since the early 2000s (Green 2007; Gallie 2007; Kalleberg 2011). Drawing on a multitude of dimensions to depict job quality is also a reflection of the fact that measures such as (subjective) job satisfaction and well-being have been shown to have little relevant relation to other objective elements of job quality (e.g. Muñoz de Bustillo and Fernández Macías 2005) and very limited policy relevance as they are essentially a black box (on job satisfaction also see Gallie 2007, p. 7f). Moreover, there is relatively limited variation across national contexts and labour market sub-groups in well-being (e.g. Russell et al. 2020).

Advantages of multi-dimensional job quality indices are manifold: by providing information on sub-dimensions of job quality and the underlying indicators, they provide a complex view of job quality. This allows, for example, analysis on how different sub-components of job quality interact or on how some countries, labour market groups or sectors are doing better on some than other job quality dimensions (for examples see Piasna 2017). By doing so they provide a much more useful starting point for policy makers than aggregate information on job satisfaction or single indicators capturing the qualitative dimension of employment such as wages or health and safety alone.

Capturing multi-dimensional job quality requires an interdisciplinary approach drawing on theories from economics, sociology and other social sciences. In this tradition, Green (2007), accordingly, focuses on five core aspects of job quality, namely skill, work effort, personal discretion, pay and security. Similarly, Muñoz de Bustillo et al. (2009, 2011) provide a comprehensive discussion of the traditions in job quality and emphasize how they are structured by various academic disciplines. Importantly, also within disciplines, approaches to job quality differ. In economics, for example, the orthodox approach focuses on labour compensation (wages) whereas more heterodox approaches are interested in power relation, and behavioural economic approaches, in turn, in participation dimensions. In sociology, one can distinguish traditional approaches with a focus on intrinsic quality (e.g. skills, autonomy, social isolation) and institutional approaches focusing on segmentation and employment quality (e.g. contractual status, opportunities for career progression) (IBID). Table 2 taken from Muñoz de Bustillo et al. (2011) subsumes this discussion and derives a range of relevant job quality dimensions from the various social sciences traditions.

Table 2: Dimensions of job quality suggested by the different social sciences traditions

The orthodox economic approach: compensating differentials	The radical economic approach	Behavioural economic approaches	The traditional sociological approach: alienation and intrinsic quality of work	The institutional approach: segmentation and employment quality	Occupational medicine and health and safety literature: risks and impact of work on health	Work-life balance studies
Labour compensation: (1) wages	Power relations:	(3) Participation	Objective strand:	(10) Contractual status and stability of employment	Conditions:	Working time:
	(2) Industrial democracy as a compensating power		(4) Skills	(11) Opportunities for skills development and career progression	(12) Physical risks	(16) Duration
			(5) Autonomy		(13) Psychosocial risks	(17) Scheduling
			Subjective strand:		Outcomes:	(18) Flexibility
			(6) Powerlessness		(14) Perceived impact of work on health	(19) Regularity
			(7) Meaninglessness		(15) Absenteeism	(20) Clear boundaries
			(8) Social isolation			Intensity:
			(9) Self-estrangement			(21) Pace of work and workload

Source: Reproduced from Muñoz de Bustillo et al. 2011, p. 456.

This is just one possible depiction of dimensions of job quality and engagement with disciplinary traditions in job quality (see also Warhurst et al. 2017) as will become evident in the following section. It is useful, insofar as it convincingly illustrates how the various dimensions link to academic disciplines and schools of thought and how going beyond one disciplinary approach will help to get a more detailed and comprehensive picture of job quality.

For the purpose of our HECAT platform such a multi-disciplinary approach to job quality seems the most appropriate one. In the following section we provide an overview of multi-dimensional job quality depictions and indices with a focus on developed, and mostly European, countries. Such a limitation ensures that we can as much as possible match the identified job quality dimensions and items with available data for the HECAT platform (section 3).

2.2 Multi-dimensional job quality indices as inspirations?

Conceiving and depicting job quality as part of multi-dimensional job quality indices started around two decades ago in Europe. At the European level the Laeken indicators of Job Quality, presented at the Stockholm European Council in 2001, have spurred this trend. The Laeken indicators were to underpin the qualitative dimension of the slogan "more and better jobs (and greater social cohesion)" of the EU's Lisbon agenda. They were exclusively drawing on EU-level data and particularly the European Labour Force Survey (EU-LFS) and the European Community Household Panel (ECHP) which was later replaced by the European Union Statistics on Income and Living Conditions (EU-SILC) (see appendix 1 for an overview on the Laeken indicators). The Laeken indicators of job quality have been criticized on various accounts including the lack of important dimensions such as wages and social dialogue and workers' involvement (no agreement on measure), the inclusion of quantitative indicators and transitions measures as well as gender and age gap measures (see Davoine et al. 2008 and Muñoz de Bustillo et al. 2009). In contrast to quantitative employment indicators, job quality was to play a sub-ordinated role in the monitoring of EU employment policies as part of the European Employment Strategy (EES), also called Open Method of Coordination (OMC) in Employment (see Bothfeld and Leschke 2012). A very limited set of job quality dimensions –

particularly those pertaining to job flexibility and job security - was included in the EU flexicurity agenda from the mid-2000s onwards and was thereby also part of EU policy coordination in employment (see IBID; Smith et al. 2019).

While EU-LFS and EU-SILC data only capture job quality items to a limited degree (for more information see section 3), the European Working Conditions Survey[9] (EWCS) had already been launched in 1990 by the tri-partite EU agency for the Improvement of Living and Working Conditions (Eurofound). The EWCS is carried out at a 5-yearly interval and nowadays contains comprehensive information on subjective and objective job quality across countries, sectors and occupations. Themes covered include among others working time and work intensity, physical and psychosocial risk factors, health and safety, work-life balance and worker participation. The availability and easy accessibility of the EWCS data through the UK Data Service (UKDS) has supported comparative academic endeavours on job quality and multi-dimensional job quality indices. The usefulness of EWCS data for depicting job quality in a multi-dimensional way has become particular evident with the comprehensive report on 'Trends in Job Quality' by Green and Mustafa in 2012 (Eurofound 2012). The EWCS has however not played a prominent role in the EU policy process (for more information on the EWCS data see section 3).

In our view there are a number of good comparative European examples of multi-dimensional job quality indices. Naturally, they all differ slightly in the denomination of the sub-dimensions of job quality (sub-indices) and the choice of variables (indicators) for the different sub-dimensions of job quality. This is visible from appendix 2a-2c where we provide three examples of job quality indices. Piasna 2017 (earlier versions Leschke and Watt 2008, 2014) is based on aggregate data drawing on Eurostat data and the EWCS. Muñoz de Bustillo et al (2011b) (latest version Antón et al. 2015) and Eurofound (2012) (latest version Eurofound 2017) are both exclusively based on individual level EWCS data.[10] Warhurst et al (2017) undertaking a thematic literature review on understanding and measuring job quality conclude that while we lack an agreed definition and measure, there is substantive overlap in job quality dimensions that researchers identify. Warhurst et al. (2017 p. 21) suggest the following dimensions:

- **Pay and other rewards** (wage level, non-wage fringe benefits and subjective aspects including satisfaction with pay)
- **Intrinsic characteristics of work** (objective aspects including skills, autonomy and control and subjective aspects including meaningfulness and social support)
- **Terms of employment** (objective aspects including contractual stability and career development opportunities and subjective aspects including perceptions of job security)
- **Health and safety** (physical and psycho-social risks)
- **Work-life balance** (including working time arrangements and work intensity)
- **Representation and voice** (including employee consultation and involvement and trade union representation)

The list above can serve as a starting point for identifying relevant dimensions and indicators for our tool. When comparing this list with the job quality indices depicted in

[9] See :https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys-ewcs

[10] For a fuller list of comparative and country-specific job quality indices and a summary of the main indicators see Muñoz de Bustillo et al (2011a, table 2 and table 3p. 464ff) and Warhurst et al. (2017, appendix 1, p. 37-39).

Appendix 2a-2c it will become evident though that across job quality indices the number and denomination of dimensions varies and so do the indicators and variables listed under the different job quality dimensions (see also the systematic review by Stefana et al. 2021). Ultimately, the choice of the relevant dimensions, indicators and variables should be driven by the specific underlying purpose of use of the job quality dimensions or, potentially, job quality index. In our case, the focus is on the user-driven HECAT platform for jobseekers and counsellors.

The ILO's decent work agenda and the OECD' job quality framework are deemed as less relevant for our purpose. The same is true for country-specific job quality monitoring initiatives as we are looking for input for the HECAT platform that is easily transferable from one EU country to another. For more information on these initiatives see appendix 3.

We would like to highlight the following recommendations by Muñoz de Bustillo et al. (2011a) for modelling job quality in a multi-dimensional way as many of the points they put forward are also relevant for our platform:

- Provide a clear definition of the different job quality items and be transparent with regard to data and methods used in order to ensure replicability
- Wherever possible use results rather than procedures as input indicators (there may be relevant exceptions to this such as channels of employee participation in the company)
- Limit attributes to those directly related to the job itself – indicators such as employment rates, welfare programmes and transitions between employment stati are not considered part of job quality indicators
- Individual-level data is preferable to aggregate data as it allows to study interactions between different dimensions

While the authors, in agreement with Leschke and Watt (2014), also recommend to provide a cumulative index side by side with sub-indices (for a different opinion see Green and Mostafa for Eurofound 2012), we do not believe that a composite index is advisable for the visualisation tool of our HECAT platform; instead the focus should be on providing a set of sub-indices (attributes) among which the unemployed/jobseeker can chose his/her preferences for a quality job.

Similarly, while an index of job quality should focus on jobs, not the people hired to perform them and thus avoid including dynamic dimensions (such as information whether temporary employment is a trap or stepping-stone) (Muñoz de Bustillo et al. 2011a), for our HECAT platform some level of individualization (e.g. comparing previous and prospective wages) might actually be beneficial.

In the following we draw on challenges that Leschke and Watt (2014) have put forward with regard to building a European job quality index and relate them to our HECAT platform:

- One needs to carefully consider the *relevance* of the single *sub-dimensions* as well as the *indicators* that make up these sub-dimensions.[11] For our tool this should be as much as possible driven by the jobseekers own individual experiences and

[11] For a discussion on alternative specifications on the sub-index "working time and work-life balance" of the ETUI job quality index and the implication for country rankings' on this sub-index see Leschke et al. (2012, p. 36-39).

preferences. Thus, in principle, the broader the choice between job quality items, the better. This, however, has to be carefully weighted by the necessity to provide a platform that is manageable and not overwhelming for the jobseeker.

- *Comparability over time and space* (our ambition of conceiving a platform that is transferable across Europe) require various compromises in terms of conceptualisation of job quality as we need to be able to link the respective dimensions with relevant data
  - For the purpose of the HECAT platform, the anchoring of the tool in the PES will weaken this challenge to some degree as customised data can be collected there (and stability over time ensured) and then combined with information from other sources
  - The anchoring of the tool in the PES might also weaken another challenge, namely that it is not uncommon that the collection of specific job quality items is discontinued over time or that the wording of questions or response categories changes
- *Data frequency* is in some cases low (e.g. the EWCS data is only available at a 5-yearly basis). Having said this job quality items are for the most part slow moving targets implying that this might not be too serious a problem at least in 'normal times'.[12]
- *Weighting*
  - The question whether to give more weight to some sub-dimensions than others is particularly relevant when providing a cumulative index of job quality. Most composite indices rely on equal weighting (OECD 2008).
  - However, even if no cumulative index is provided, sub-indices (attributes) usually comprise several indicators which raises the question whether to apply weights at that level.[13]
  - If the HECAT platform is able to provide options of job quality dimensions (and indicators therewithin) to be picked, or, in turn disregarded, by the unemployed/jobseekers, the platform will indirectly apply weighting.
- Finally, decisions also have to be taken on how to code response categories for categorical variables (where to pre-set cut-off points for example when focusing on user wishes for work intensity) and how to deal with missing values if any

2.3 Job quality in the context of unemployment and job-seeking

When considering relevant job quality dimensions, measurement and potentially weighting, we have to keep in mind the context of the HECAT platform, namely job-search processes of unemployed (and broader groups of jobseekers) that are carried out individually or with the help of a caseworker.

[12] See Piasna (2017) for a discussion of job quality developments over time and Leschke and Watt (2014) who discuss the impact of the 2008/2009 economic crisis on the development of job quality dimensions in European countries.

[13] Leschke, Watt and Finn (2008) with reference to the ETUI job quality index check the sensitivity of overall results when changing weights for four sub-indices. Moderate shifts of these subjective weights do not lead to fundamentally different rankings of countries in the sub-indices.

First, there might be dimensions that are not central in the job quality literature but which may be relevant for the specific setting and ambition of our platform. First, there is the *geographic distance of the job offer* and the assessment what is an acceptable distance and what is not. In fact, geographic distance is one of the dimensions that is usually included in the job search requirements that the PES lays out as a quit pro quo for the receipt of unemployment benefits. What is an acceptable geographic distance of a new job is sometimes specified in view of the specific situation of the jobseeker (e.g. dependent children and thereby restrictions to geographic mobility) and the requirements also sometimes get stricter with time in unemployment (Venn 2012). Geographic location is indeed also a common dimension in job recommender systems (e.g. Gutiérrez et al. 2019). Such an option, to be decided upon by the jobseeker, will make the potential amount of visualizations of the platform more relevant and manageable.

Second, there is a high likelihood that wishes for a quality job are not independent of *previous labour market experience*. To provide a simple example, when judging the adequacy of a specific wage linked to a job offer, the jobseeker will likely take a starting point in his/her previous job and wage. Thus, it would not be advisable to use a pre-set wage amount in the pay-dimension but rather leave the choice to the jobseeker. It is likely that the PES has information on the previous wage (i.a. as basis of calculation of unemployment benefits) and this could be used to flag jobs with approximately the same, lower and higher wages. Alternatively, the jobseeker could plug in the relevant amount. Similarly, it is more likely that jobs which are in the same or a similar occupational category and thus require skills that are close to the ones the jobseeker already possesses are more relevant to the jobseeker than jobs in other occupations. This should not exclude the possibility that the jobseeker might be interested in shifting occupation and such a possibility should also be built into the platform. The latter might however require skills-upgrading which could happen with the assistance of the PES. In this regard, the platform could potentially even be used to flag up relevant ALMP measures. It should be noted that it has been shown that employed and unemployed job seekers differ in their occupational mobility (e.g. Longhi and Taylor 2013) and that occupational mobility varies according to the extent of occupational regulation in a given welfare state and occupation (e.g. Longhi and Brynin 2010; Damelang et al. 2018).

Third, the *concrete situation of the unemployed/jobseeker* will impact his/her assessment of what is a good job. Gutierrez et al. 2019 have shown that there is a great variation in the type of information that jobseekers consider the most important. Rather than pre-setting certain dimensions by simple proxies such as gender or migration background as is commonly done in profiling models (e.g. Allhuter et al. 2020 for Austria; Desiere and Struyven 2020 for Belgium) the HECAT platform should allow for the users to adapt the relevant functions to their perceived needs. Examples are work intensity which may or may not be restricted by care obligations. Similarly, some users might not wish for a permanent full-time job but rather for a trainee or apprenticeship position or a fixed-term project assignment. Some users – for example those with limited prior labour market experience, no or low education level and/or long spells of unemployment - might even be interested in jobs with characteristics that are not usually deemed as high quality.

This implies that jobseekers should have the possibility to freely set the different job quality dimensions depicted on the platform (user-driven approach). This consideration is particularly relevant for the labour market context where our PES pilot sites are based as precarization is a challenge in Slovenia, particularly for youth and migrants (see Hansen and

Pultz 2021, Deliverable 1.1). In some instances, precarious jobs may act as stepping stones to more favourable future labour market outcomes though this is by no means the rule (e.g. Mattijssen and Pavlopoulos 2019).

3. Wish list and data sources

The literature previously described leads us towards the following 'wish list' of variables that we categorize as 'need to have' or 'nice to have' for a tool predicting the probability of exit into good jobs and/or a visualization tool that takes into account job quality.

Table 3 about here

Informed by the job quality literature, we provide a wish list of 24 job quality items that we view as the most important for the HECAT platform. The items fall under 7 job quality sub-dimensions: pay and other rewards, intrinsic characteristics of work, terms of employment, health and safety, work-life balance, representation and voice, distance to work. We classified the items on a 3-level scale, according to their importance. The first level can be referred to as 'need-to-have' information, the second and third levels as 'nice to have'. This choice was based on our reading of job quality literature, but also certainly uncovers some arbitrary preferences from a researchers' perspective and impacted by specific academic discipline. The jobseekers' and counsellors' perspective on the items and their importance can be tested as part of the focus groups in work package 5. Some inspiration for this is to be found in Feld et al. (2020) who, in a RCT framework, studied which job characteristics the unemployed value the most. Likewise, if the focus groups in WP 5 suggests that the job quality component of the tool is too complex – that is the jobseekers or/and the counsellor are overwhelmed by the number of dimensions – then we would suggest to focus on the 1st level items or to the items that turn out to be the most relevant according to the focus groups. . The HECAT platform will combine a prediction of jobseekers' probability of exit into good jobs and an individualized forecast of expected job openings. The dimensions highlighted in Table 3 have slightly different functions for the two components. As for the former, they refer to the occupations that jobseekers, observed in the training data for the matching learning algorithm, take upon leaving the unemployment registry. As for the latter, the dimensions refer to the expected job openings, so that the algorithm can select the most relevant ones to be shown to each user.

One objective of this deliverable was to provide data sources to measure the selected dimensions. Columns (5) to (10) of Table 3 provide an ordered list of 1 to 3 datasets for this purpose. In most cases, we expect register data to include sufficient information to measure the dimension. However, this does not apply to the subjective characteristics of jobs (e.g. meaningfulness of the job) and to the variables impacted by human resource practices (e.g. autonomy and control). These dimensions can only be proxied by non-exhaustive survey data. Such data allows to compute averages of a dimension at the ISCO (occupation) or NACE (sector) level and to approximate the value applying for the job at stake. Because the HECAT platform should be transferable across EU countries, we suggest using EU survey data including the EU-LFS (European Union Labour Force Survey, source here), EU-SILC (European Union Statistics on Income and Living Conditions, source here) and EWCS (European Working Conditions Surveys, source here) databases (see a discussion of relevant datasets in Boškoski and Boshkoska. A major drawback of these databases is the low case numbers. Ideally, one would like to match these databases with the jobs at stake at the most disaggregate ISCO × NACE levels. However, the low case numbers imply that only few

individuals would be covered in each cell, thereby limiting the precision of the results. Therefore, for practical reasons, we have to only match on the ISCO *or* the NACE codes. To our knowledge, the variation of job quality measures is stronger within sector across occupations that within occupations across sectors. For this reason, we recommend to privilege matching on occupations (i.e. ISCO codes).[14] Ideally, we would like to work at the 3 digit for the ISCO codes. This level is justified by the case numbers, but also because more disaggregate levels (ISCO, 4 digit) can be imprecise as neighbouring occupations and sectors become very close to each other.[15] However, note that ISCO codes are unfortunately only available at the 2-digit level in the EUSILC and the EWCS. Most users will not be able to frame their wish in terms of 2- or 3-digit ISCO code on the spot. Therefore the tool would need to track them from the broader occupational group (1-digit ISCO group) towards the more detailed ones (2- or 3-digit ISCO groups). When possible, the EU-LFS should be preferred to the EU-SILC due to higher case numbers. The EWCS should be used as last resort due to its very low number of observations (about 1600 in 2015 for our pilot site, Slovenia) and because it is only run every 5 years.[16] The detail of the variables in each dataset is provided in Appendix 4.

[14] For some of the dimensions, the NACE may be more appropriate in certain circumstances such as economic crises – which have a more homogenous effect within sectors than within occupations. This is exemplified by the probability that the establishment closes in the next 6 months or by the items capturing representation and voice at work. Accommodating this complexity would overwhelm the users and we therefore recommend to overlook this.

[15] See a discussion on this matter in the EWCS preparatory files here.

[16] The most recent wave (2021 instead of 2020 due to COVID) will include higher case numbers for selected countries, but the data is not available yet.

Table 3: Classifying and measuring the characteristics of jobs in the HECAT plaform (see Appendix 4 for details on the variables)

	Notes under the table	Indicator	Value	Order of importance	Database (1st best)	Variables	Database (2nd best)	Variables	Database (3rd best)	Variables
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pay and other rewards	(a)	Wage compared to previous occupation	Low; similar (+/- 10 %); high	1	National register data		EU-LFS - match at the ISCO 3 digit level	INCDECIL	EU-SILC - match at the ISCO 2 digit level	PY010G, PY020G
Intrinsic characteristics of work	(b)	Skills matching	ISCO code compared to the previous occupation	1	National register data		EU-LFS - match according to a transitional graph (see comment)	ISCO3D	EU-SILC - match according to a transitional graph (see comment)	PL051
	(c)	Educational requirement	Underqualified; qualified; overqualified	2	National register data		EU-LFS - match at the ISCO 3 digit level	HAT11LEV	EUSILC - match at the ISCO 2 digit level	PE040
	(d)	Autonomy and control	Such as perceived by workers in the same ISCO	3	EWCS - match at the ISCO 2 digit level	Q54A-C ; Q42; Q53B-C; Q61C; Q61N				
	(e)	Meaningfulness of the job	Such as perceived by workers in the same ISCO	3	EWCS - match at the ISCO 2 digit level	Q61H-J				
Terms of employment	(f)	Type of contract	Self-employed or dependent work. If dependent, then (i) permanent standard contract; (ii) fixed standard contract; (iii) trainee; or (iv) apprenticeship	1	National register data		EU-LFS - match at the ISCO 3 digit level	STAPRO, TEMP, TEMPREAS	EU-SILC - match at the ISCO 2 digit level	PL040, PL140, PL031
	(g)	Job security (objective)	Probability to remain employed for more than 12 months	2	Computed using the register data		EU-LFS - match at the ISCO 3 digit level	WSTAT1Y		
	(h)		Probability that the establishment closes in the next 6 months	3	Computed using the register data					
	(i)	Job security (subjective)	Job security - such as perceived by workers in the same sector	3	EWCS - match at the ICSO 2 digit level	Q89G-H				
	(j)	Career advancement opportunities (Objective)	Sum of expected earnings over 5 years	3	Computed using the register data (average earnings over 5 years of individuals in the same isco)					
	(k)	Career advancement opportunities (Subjective)	Career advancement opportunities - such as perceived by workers in the same ISCO	3	EWCS - match at the ISCO 2 digit level	Q89 - B				
	(l)	Training opportunities	Employers normally offer training courses	3	EU-LFS - match at the ISCO 3 digit level	COURATT, COURWORH	EWCS - match at the ISCO 2 digit level	Q66		

Health and Safety	**(m)**	Physical risks	Sector with a high incidence of work accidents	3	European statistics on accidents at work - only available at the NACE 1 digit level	HSW_N2_01, HSW_N2_02	EU-LFS - adhoc modul 2013 - match at the ISCO 2 digit level	AWNUMBR, AWDOFF, PHYSRISK	EWCS - match at the ISCO 2 digit level	Q83A, Q83B, Q29 A-I, Q30 A-C
	(n)	Psycho-social risks	Work negatively affects mental health	3	EU-LFS - adhoc modul 2013 - match at the ISCO 2 digit level	MENTRISK	EWCS - match at the ISCO 2 digit level	Q81 A-C, Q80 A-D, Q45A		
Work-Life balance	**(o)**	Working time	Full-time (> 30 hours a week or number of hours not provided in the contract); Part-time (16-30 hours) or Marginal (< 15 hours)	1	Register data		EU-LFS - match at the ISCO 3 digit level	VARIABLE HWUSUAL	EUSILC	PL060
	(p)	Non-standard working time	Work at night or during week-ends	1	EU-LFS - match at the ISCO 3 digit level	NIGHTWK, SATWK, SUNWK	EWCS - match at the ISCO 2 digit level	Q37A, Q37B, Q37C		
	(q)	Involuntary part-time work	Yes/No	2	EU-LFS - match at the ISCO 3 digit level	FTPTREAS	EUSILC - match at the ISCO 2 digit level	PL120		
	(r)	Flexibility of working time	Important/limited	3	EU-LFS - adhoc modul 2019 - match at the ISCO 3 digit level	VARIWT	EWCS - match at the ISCO 2 digit level	Q42		
	(s)	Home office	Frequency	3	EU-LFS - match at the ISCO 3 digit level	HOMEWK				
Representation and voice	**(t)**	Collective bargaining coverage	Share of workers that are covered in the occupation	2	Register data					
	(u)	Trade union density	Share of workers that are covered in the occupation	2	Register data					
	(v)	Representation at the firm level	Share of workers that are covered in the occupation	2	Register data					
	(w)	Self-assessed Quality of employer-employee relations	Share of workers that are covered in the occupation	2	EWCS - match at the ISCO 2 digit level	Q70 B,C,F				
Distance to work	**(x)**	Distance to work	Distance in kilometres between home and work	1	Register data					

Source: Authors' computations

Notes: (a) EU-LFS & EWCS provide net wages; EU-SILC provides gross wages. Note that the variation +/- 10 % does not have the same implications for the bottom and the top of the distribution.

(b) Skill matching should be assessed by using a transitional graph highlighting the most usual job-to-job transitions.

(d), (e), (m), (n), (p) inspiration for the EWCS data partly comes from Muñoz et al. (2011b)

(m) Regarding the EU-LFS data, one should either use q83a & q83b OR q29 & q30. We see the former as strongly dependent on the institutional setting (due to a variation in the ease of access to health insurance, in whether self-employed workers have access to sick leaves, etc..) to the extent that figures could artificially be very low in some settings. We would therefore privilege q29 & q30 over q83a & q83b.

Regarding the European statistics on accidents at work, the data can be found on the Eurostat website. More information here.

(m), (n) EU-LFS data come from the 2013 adhoc module on Health and Safety at Work (the adhoc module was also run in 2020 but the data is not available at the time of writing). It is run on a subsample of observations - that is larger than the EWCS database.

(q) We define involuntary part time jobs with reference to individuals who state that they could not find a full time job, thereby excluding childcare or family reasons which might also underlie involuntary part-time. This is the most conservative measure, and we acknowledge that households act within institutional constraints that can limit their ability to take on full-time jobs.

(t), (u), (v) No EU survey data provide detailed measure of these variables at a disaggregate level

Conclusion

Drawing on accounts of the lived experience of unemployed in Europe and Slovenia, the report set out to discuss dimensions of job quality and how they can be integrated into the HECAT platform – that will combine a prediction of jobseekers' probability of exit into good jobs and an individualized forecast of expected job openings. This was done by first discussing the benefits and drawbacks of state-of-the-art profiling systems. A particular focus was placed on discussing the common output variable – integration into any type of employment in the next 6 or 12 months rather than sustainable employment. We showed that, behind an apparently very straightforward and neutral measure non-transparent subjective decisions are hidden. In response to these shortcomings, we put forward the HECAT platform vision that aims to consider job quality in a multi-dimensional way in the different functions of the platform. In view of this vision, we scrutinised the multi-disciplinary literature on job quality and put forward a list of job quality dimensions to consider for our tool. These dimensions were as follows: pay and other rewards, intrinsic characteristics of work, terms of employment, health and safety, work-life balance, representation and voice and distance to work. Then, in a last section we did a census of the relevant datasets in view of filling these job quality dimensions with meaning. To provide an example for the dimension "terms of employment" we identified the following variables: type of contract, job security (objective and subjective), career advancement opportunity (objective and subjective) and training opportunities. We provided information on the relevant databases that contain these variables and also made proposals as to which database will be the most suitable for a given item. Furthermore, we included a subjective prioritisation of the different items ("need to have" and "nice to have" using three different priority levels). For the job quality dimension "terms of employment" we characterised type of contract as "need to have" and all other items as nice to have though with a somewhat higher intermediate prioritisation of objective job security. Such a prioritisation might be necessary in order not to render the platform options on job quality so complex that they will impede the easy use of the platform. Our subjective prioritisation should however be re-assessed by the unemployed and jobseekers themselves when possible, as part of the piloting of the platform to be carried out in work package 5. Importantly, the visualisation component of the platform should contain the possibility for the jobseeker as platform user to prioritise specific job quality outcomes over others and if possible be provided with job offers according to these prioritisations. In our view, a composite job quality measure would not be useful for the present tool because it would require the researchers and platform developers to predefine a rule to aggregate all job quality measures. Instead, providing the user with a limited number of job quality items will allow her to make a relevant choice based on her own preferences.

The proposed approach of putting sustainable labour market integration upfront and going well beyond providing a mere profiling score by way of visualizing different labour market opportunities squares nicely with the HECAT project's vision of working with rather than on the unemployed. The analysis has shown that there is not one unequivocal definition of job quality rather it can have many different meanings as shaped by academic discipline, context and preference. This is both an advantage, as such a flexible concept allows adaptation to the varying situations, experiences, and aspirations of the unemployed and jobseekers but also poses challenges. The fact that capturing job quality comprehensively is complex might have implications for the functionality of the platform (ease of use) but also for the counselling process as counsellors will need to handle multifaceted – and potentially unrealistic – aspirations of the jobseekers towards a new job. A redefinition of the output variable as sustainable employment rather than any type of employment implies that more jobseekers may

be in need of additional active support measures and in particular training and up-skilling. This has implications for the PES. Given the potential bridging function between some of the ALMP measures and aspirations for a good quality job one might want to consider providing targeted information on ALMPs through the HECAT platform either to counsellors only or to both jobseekers and counsellors. Whether such a combination of ALMP information with the other HECAT platform functionalities is appropriate of course crucially depends on the availability and accessibility of relevant ALMP measures. The fact that our pilot site is located in a region where ALMP expenditure is traditionally low questions the viability of including this feature.

As has been shown there are some limitations also with regard to the available data. Limited case numbers for the European comparative datasets and particularly the EWCS - which is otherwise the most suitable database for capturing job quality - are a case in point. This implies that we may lack precision in the measurement of the job quality items at a sufficiently disaggregate level (occupation, sector and/or geographic levels). Similarly, frequency of data availability with the 5-yearly rhythm of the EWCS are somewhat problematic. Register data should allow us to circumvent this issue, but they lack the necessary information on subjective characteristics of jobs and on variables related to human resource practices

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Appendix

Appendix 1: The Laeken indicators of Job Quality

Dimensions		Indicator
I. Characteristics of the job itself	1) Intrinsic job quality	Transitions between non-employment and employment and, within employment, by pay level.
		Transitions between non-employment and employment and, within employment, by type of contract
		Satisfaction with type of work in present job.
	2) Lifelong learning and career development	Percentage of the working population age in education and training by gender, age group, employment status and education level.
		Percentage of the labour force using computers in work, with or without specific training.
II. The Work and Wider Labour Market Context	3) Gender equality	Ratio of women's gross hourly earnings to men's for paid employees at work
		Employment rate gap between men and women
		Gender segregation in occupations
		Gender segregation in sectors
	4) Health and safety at work	The evolution of the incidence rate (accidents)
	5) Flexibility and security	No. of employees working part-time and with fixed-term contracts as a percentage of the total number of employees
	6) Inclusion and access to the labour market	Transitions between employment, unemployment and inactivity
		Transitions between non-employment and employment or training
		Total employment rate, and by age group and education level
		Total long-term unemployment rate, and by gender
		Percentage of early school leavers
		Youth unemployment rate
	7) Work organisation and the work-life balance	Difference in employment rates for individuals aged 20-50 in households having/not having a child aged 0-6 years
		Children cared for (other than the family) as a proportion of all children in the same group
		Employees who left their job for family duties during the past year and intend to go to work, but are currently unavailable for work
	8) Social dialogue and workers' involvement	No agreement
	9) Diversity and non-discrimination	Employment rate gap for workers aged 55-64 years old
		Employment and unemployment rate gaps for ethnic minorities and immigrants
	10) Overall economic performance and productivity	Growth in labour productivity (both per hour worked and per person employed)
		Total output (both per hour worked and per person employed)
		Percentage of the population having achieved at least upper secondary education by gender, age group and employment status

Source: Muñoz de Bustillo 2009, table 9, p. 71.

Appendix 2: Examples of influential comparative job quality indices

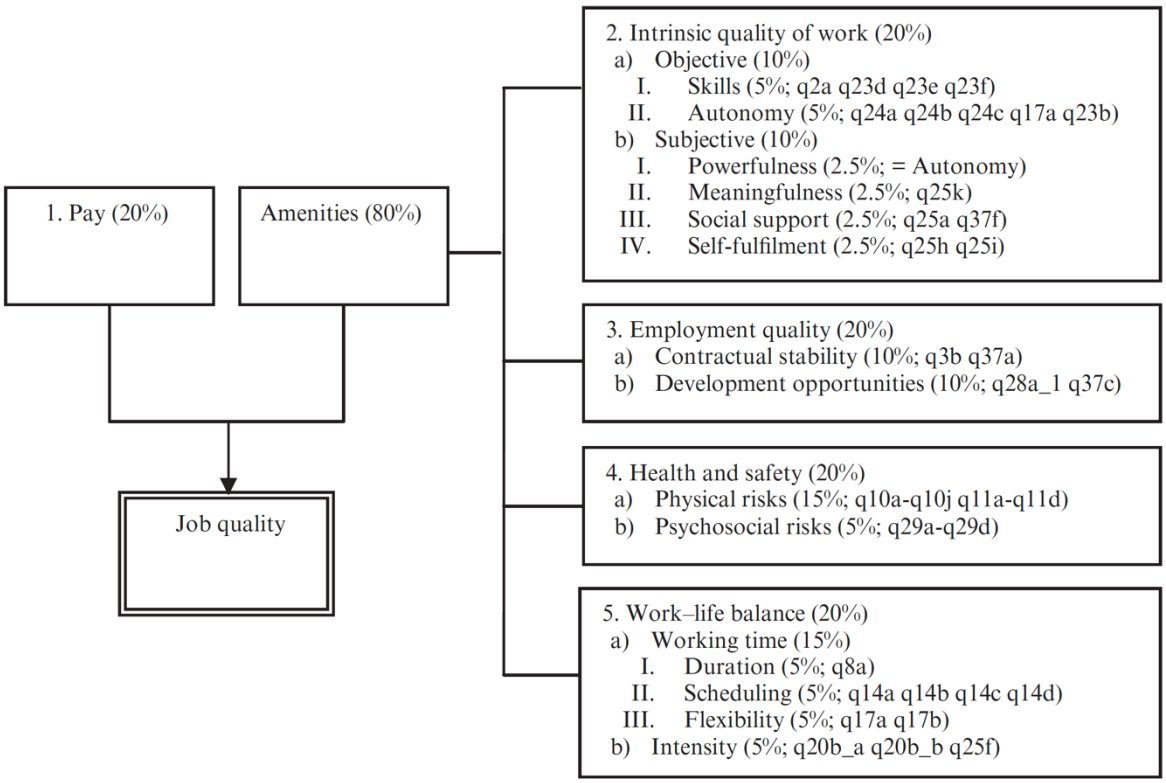
Appendix 2a: ETUI Job Quality Index

Table A1 **Dimensions of the Job Quality Index and their indicators: 2005-2015**

Sub-indices	Indicators	Data source	Weighting
1. Wages	Average net monthly earnings from main paid job, adjusted for PPP (2015)	EWCS / Eurostat	<separate>
	Real compensation per employee	AMECO	
2. Forms of employment and job security	Temporary employment as a share of total number of employees*share of temps indicating that main reason was that they could not find permanent job	Eurostat (LFS)	1/3
	Part-time employment as a share of total number of employees*share of part-timers indicating that main reason was that they could not find full-time job	Eurostat (LFS)	1/3
	'I might lose my job in the next six months'	EWCS	1/3
3. Working time and work-life balance	Share of workers working more than 48 hours a week	EWCS	1/3
	Average of share of workers on shift work; Saturday work; Sunday work; night work; evening work.	Eurostat (LFS)	1/3
	'Working hours fit with family/social commitments'	EWCS	1/3
4. Working conditions	'Work intensity' (working at a very high speed, working to tight deadlines and not having enough time to get the job done)	EWCS	1/3
	'Work autonomy' (can choose/change order of tasks, methods of work, speed of work; can take a break when you wish)	EWCS	1/3
	'Physical work factors' (vibrations; noise; high/low temperature; breathing in smoke, fumes, powder, dust, vapours such as solvents and thinners; handling chemical substances; radiation (b), tobacco smoke from other people; infectious materials; tiring or painful positions; lifting or moving people; carrying or moving heavy loads; repetitive hand or arm movements)	EWCS	1/3
5. Skills and career development	Share of population (25-64 years) participating in education/training over four weeks prior to survey	Eurostat (LFS)	3/5
	'My job offers good prospects for career advancement'	EWCS	2/5
6. Collective interest representation	Collective bargaining coverage	ICTWSS database	1/3 (2015) 3/5 (2005-2015)
	Trade union density	ICTWSS database	1/3 (2015) 2/5 (2005-2015)
	Employee representation in the company/organisation (trade union or works council; health and safety delegate; regular meetings with employees)	EWCS	1/3 (2015)

Source: Piasna 2017, p. 39.

Appendix 2b: Job quality index (Muñoz de Bustillo and team)



Source: Muñoz de Bustillo et al 2011b, ch. 5, p. 152.

Appendix 2c: Eurofound's Job Quality Index

Table 1: Structure of the indices of job quality

Index	Brief description of content	Items used in construction *
Earnings	Hourly earnings	EF10, EF11, Q18
Prospects	Job security, career progression, contract quality	Q77A, Q77C, Q6, Q7
Intrinsic Job Quality	*Skills and Discretion (0.25)* • skills and autonomy	Q61A, Q61C, Q49C, Q49E, Q49F, Q50A, Q50B, Q50C, Q51C, Q51E, Q51I, Q51O, Q24H, ef1_isced, isco_08_2
	Good Social Environment (0.25) • social support, absence of abuse	Q51A, Q51B, Q58A, Q58B, Q58C, Q58D, Q58E, Q77E, Q70A, Q70B, Q70C, Q71A, Q71B, Q71C
	Good Physical Environment (0.25) • low level of physical and posture-related hazards	Q23A to Q23I, Q24A to Q24E
	Work Intensity (0.25) • pace of work, work pressures, and emotional/value conflict demands	Q45A, Q45B, Q46A to Q46E, Q51G, Q51L, Q51P, Q24G
Working Time Quality	Duration, scheduling, discretion, and short-term flexibility over working time	Q18, Q32, Q33, Q34, Q35, Q39, Q40, Q43

* Question numbers refer to the questionnaire, in the annex to this report. The programmes used to construct the indices can be obtained on request from the authors.

Source: Eurofound 2012, p. 20.

Appendix 3

ILO decent work agenda, OECD job quality iniative and country-specific multi-dimensional job quality indices

The **ILO's decent work agenda** is very well-known. It is however less relevant for our purpose as it contains a broader set of indicators going beyond job-focused job quality and addressing for example issues such as child-labour, social protection but also employment opportunity. In terms of detailed depiction of job quality, data is even more of a challenge given the broad coverage beyond Europe. For more information see here.

Similarly, the **OECD job quality initiative**, is deemed of little relevance for our purpose as its framework is restricted to three dimensions only (earnings quality, labour market security, quality of the working environment) and the indicators do not strictly address job-focused job quality. For more information see here.

Country-specific multi-dimensional job quality indices are often closely linked to the trade union movement. Prominent examples are the **Austrian Arbeitsklima Index** (Preinfalk 2007), the **DGB-Index Gute Arbeit** and the **Flemish Workability Monitor** (Van Guyes 2006).

Appendix 4 – Description of variables used in Table 4

Database	Variable	Question	Possible answers
EULFS - standard	INCDECIL	Monthly (take home) pay from main job (in deciles)	
	HAT11LEV	Highest educational attainment (ISCED 1 digit level)	
	ISCO3D	ISCO at the 3 digit level	
	STAPRO	Professional status.	Self-employed with employees; Self-employed without employees; Employee; Family worker; Not Applicable; No answer
	TEMP	Permanency of the job.	Person has a permanent job or work contract of unlimited duration; Person has temporary job/work contract of limited duration; Not applicable; No answer
	TEMPREAS	Reasons for having a temporary job/work contract of limited duration.	It is a contract covering a period of training (apprentices, trainees, research assistants, etc.); person could not find a permanent job; person did not want a permanent job; it is a contract for a probationary period; it is a contract covering a period of apprenticeship; it is a contract covering a period of training other than apprenticeship (trainees, internships, research assistants, etc.); Not applicable; No answer
	WSTAT1Y	Situation with regard to activity one year before survey.	Carries out a job or profession, including unpaid work for a family business or holding, including an apprenticeship or paid traineeship, etc,; Unemployed; Pupil, student, further training, unpaid work experience; In retirement or early retirement or has given up business; Permanently disabled; In compulsory military service; Fulfilling domestic tasks; Other inactive person; Not applicable; No answer
	COURATT	Did you attend any courses, seminars, conferences or received private lessons or instructions outside the regular education system within the last 4 weeks?	Yes / No
	COURWORH	Did the most recent taught learning activity take place during paid working hours?	Only during paid working hours; Mostly during paid working hours; Mostly outside paid working hours; Only outside paid working hours; No job at that time
	NIGHTWK	Night work.	Person usually works at night; Person sometimes works at night; Person never works at night
	SATWK	Saturday work.	Person usually works on Saturdays; Person sometimes works on Saturdays; Person never works on Saturdays
	SUNWK	Sunday work.	Person usually works on Sundays; Person sometimes works on Sundays; Person never works on Sundays
	FTPTREAS	Reasons for the part-time work.	Person is undergoing school education or training; Of own illness or disability; Looking after children or incapacitated adults; Other family or personal reasons (from 2006); Person could not find a full-time job; Of other reasons
	HOMEWK	Working at home.	Person usually works at home; Person sometimes works at home; Person never works at home
EULFS - Adhoc module 2013	AWNUMBR	Accidents at work in the last 12 months.	None, One, Two or more
	AWDOFF	Period off because of accident.	Still off work because has not yet recovered from the accident, but expects to resume work later; Expects never to work again because of this accident; Less than one day or no time off; At least one day but less than four days; At least four days but less than two weeks; At least two weeks but less than one month; At least one month but less than three months; At least three months but less than six months

	PHYSRISK	Exposure to physical health risk factors (work postures or work movements; handling of heavy loads; noise or strong vibration; chemicals, dust, fumes, smoke or gases; activities involving strong visual concentration; risk of accidents).	None of the list below; Yes, mainly to difficult work postures or work movements; Yes, mainly to handling of heavy loads; Yes, mainly to noise or strong vibration; Yes, mainly to chemicals, dust, fumes, smoke or gases; Yes, mainly to activities involving strong visual concentration; Yes, mainly to risk of accidents
	MENTRISK	Exposure to mental well-being risk factors.	None of the list below; Yes, mainly to severe time pressure or overload of work; Yes, mainly to violence or threat of violence; Yes, mainly to harassment or bullying
EULFS - Adhoc module 2019	VARIWT	How is determined the start and end of the working time in the main job?	Worker can fully decide working time; Worker can decide working time with certain restrictions, Employer or organisation mainly decides working time

EUSILC	PY010G	Employee cash or near cash gross income	
	PY020G	Non-Cash employee gross income	
	PE040	Highest educational attainment (ISCED 1 digit level)	
	PL051	ISCO at the 2 digit level	
	PL040	Status in employment.	Self-employed with employees; Self-employed without employees; Employee; Family worker; Missing; Not applicable
	PL140	Type of contract.	Permanent job/work contract of unlimited duration; Temporary job/work contract of limited duration; Missing; Not applicable
	PL031	Self-defined current economic status.	Employee working full-time; Employee working part-time; Self-employed working full-time (including family worker); Self-employed working part-time (including family worker); Unemployed; Pupil, student, further training, unpaid work experience; In retirement or in early retirement or has given up business; Permanently disabled or/and unfit to work; In compulsory military or community service; Fulfilling domestic tasks and care responsibilities; Other inactive person
	PL060	Number of hours usually worked per week in main job	
	PL120	Reason for working less than 30 hours.	Undergoing education or training; Personal illness or disability; Wants to work more hours but cannot find a job(s) or work(s) of more hours; Do not want to work more hours; Number of hours in all job(s) are considered as a full-time job; Housework, looking after children or other persons; Other reasons

EWCS	Q54	Are you able to choose or change... A. your order of tasks; B. your methods of work; C. your speed or rate of work.	Yes or No
	Q42	How are your working time arrangements set?	They are set by the company / organisation with no possibility for changes; You can choose between several fixed working schedules determined by the company/organisation; You can adapt your working hours within certain limits (e.g. flexitime); Your working hours are entirely determined by yourself]
	Q53	Generally, does your main paid job involve... B. assessing yourself the quality of your own work; C. solving unforeseen problems on your own.	Yes or No
	Q61C and Q61N	Please select the response which best describes your work situation. C. You are consulted before objectives are set for your work. N. You can influence decisions that are important for your work.	Always; Most of the time; Sometimes; Rarely; Never

	Q61H-J	H. Your job gives you the feeling of work well done; I. You are able to apply your own ideas in your work; J. You have the feeling of doing useful work.	Always; Most of the time; Sometimes; Rarely; Never
	Q89B,G,H	To what extent do you agree or disagree with the following statements about your job? B. My job offers good prospects for career advancement G. I might lose my job in the next 6 months; H. If I were to lose or quit my current job, it would be easy for me to find a job of similar salary.	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree
	Q66	Over the past 12 months, how many days in total did you spend in training paid for or provided by your employer?	1 day or less; 2-3 days; 4-5 days; 6-9 days; 10-19 days; 20 days or more
	Q83A	[Over the last 12 months] how many [days in total were you absent from work due to sick leave or health-related leave resulting due to] accident(s) at work?	
	Q83B	How many of these days of absence resulted from health problems caused or made worse by your work (excluding accidents)?	
	Q29	Please tell me, using the following scale, are you exposed at work to … A. Vibrations from hand tools, machinery etc. B. Noise so loud that you would have to raise your voice to talk to people C. High temperatures which make you perspire even when not working D. Low temperatures whether indoors or outdoors E. Breathing in smoke, fumes (such as welding or exhaust fumes), powder or dust (such as wood dust or mineral dust) etc. F. Breathing in vapours such as solvents and thinners G. Handling or being in skin contact with chemical products or substances H. Tobacco smoke from other people I. Handling or being in direct contact with materials which can be infectious, such as waste, bodily fluids, laboratory materials etc.	All of the time; Almost all of the time; Around 3/4 of the time; Around half of the time; Around 1/4 of the time; Almost never; Never.
	Q30	Please tell me, using the same scale, does your main paid job involve: A. Tiring or painful positions B. Lifting or moving people C. Carrying or moving heavy loads.	All of the time; Almost all of the time; Around 3/4 of the time; Around half of the time; Around 1/4 of the time; Almost never; Never
	Q81 A to C	Over the past 12 months, during the course of your work have you been subjected to any of the following: A. Physical violence B. Sexual harassment C. Bullying/ harassment.	Yes/No
	Q37A	Normally, how many times a month do you work at night, for at least 2 hours between 10.00 pm and 05.00 am?	
	Q37B	And how many times a month do you work on Sundays?	
	Q37C	And how many times a month do you work on Saturdays?	
	Q42	How are your working time arrangements set?	They are set by the company / organisation with no possibility for changes; You can choose between several fixed working schedules determined by the company/organisation; You can adapt your working hours within certain limits (e.g. flexitime); Your working hours are entirely determined by yourself
	Q70	To what extent do you agree or disagree with the following statements (with regards to your workplace)? B. The management trusts the employees to do their work well; C. Conflicts are resolved in a fair way; F. In general, employees trust management. Answer	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree